What is claimed is:

[c1] 1.An imaging system, comprising:

an X-ray source adapted to move in an arc shaped path;

a stationary electronic X-ray detector;

a track; and

a mechanical driving mechanism which is adapted to move the X-ray source in the arc shaped path.

[c2] 2.The system of claim 1, further comprising a processor electrically connected to the electronic X-ray detector, wherein the processor forms a three dimensional image of an imaged object from a signal output by the electronic X-ray detector.

[c3] 3.The system of claim 2, wherein the electronic X-ray detector is mounted to a second support, such that an imaging volume is formed above the detector where a patient's breast is adapted to be placed to be imaged.

[c4] 4.The system of claim 3, wherein the electronic X-ray detector comprises an X-ray sensitive scintillator and a solid state radiation detector.

[c5] 5.The system of claim 1, wherein:

the system is a tomosynthesis mammography system;

the system is positioned substantially vertical relative to ground; and

the mechanical driving mechanism is adapted to move the X-ray source in a stepped motion in the arc shaped path.

[c6] 6.The system of claim 1, wherein:

the track comprises an arc shaped track;

the X-ray source is mounted to the arc shaped track; and

the mechanical driving mechanism comprises a motor which is attached to the X-ray source and is adapted to move the X-ray source along the arc shaped track.

[c7] 7.The system of claim 1, wherein:

the track comprises an arc shaped track;

the X-ray source is mounted to the arc shaped track;

the mechanical driving mechanism comprises a first arm, having a first portion connected to the X-ray source and a second portion connected to a motor which is adapted to provide torque to the second portion of the first arm to move the X-ray source along the arc shaped track.

[c8] 8.The system of claim 1, wherein:
the track comprises an arc shaped track;
the X-ray source is mounted to a first portion of a first arm;
a second portion of the first arm distal from the first portion is mounted to the arc shaped track; and
the mechanical driving mechanism comprises a motor which is adapted to move the second portion of the first arm along the arc shaped track to move the X-ray source in the arc shaped path.

[c9] 9.The system of claim 8, wherein:
the electronic X-ray detector is mounted facing the X-ray source to a first side of a second arm such that an imaging volume is formed above the electronic X-ray detector;
a middle portion of the first arm is attached to a second side of the second arm;
the X-ray source is mounted to the first arm such that it is positioned adjacent to the first side of the second arm and moves in the arc shaped path in a plane parallel to the first side of the second arm.

[c10] 10.The system of claim 1, wherein:
the track comprises a linear motion track;
the X-ray source is mounted to a first portion of a first arm;
a second portion of the first arm distal from the first portion is mounted to the linear motion track; and
the mechanical driving mechanism comprises a ball screw which is adapted to move the second portion of the first arm along the linear motion track to move the X-ray source in the arc shaped path.

[c11] 11.The system of claim 10, wherein:
the electronic X-ray detector is mounted facing the X-ray source to a first side of a second arm such that an imaging volume is formed above the electronic X-

ray detector;

a middle portion of the first arm is attached to a second side of the second arm;

the X-ray source is mounted to the first arm such that it is positioned adjacent to the first side of the second arm and moves in the arc shaped path in a plane parallel to the first side of the second arm.

[c12] 12.A tomosynthesis X-ray mammography imaging system, comprising:

an X-ray source adapted to move in an arc shaped path;

an arc shaped track provided to allow the X-ray source to move in the arc shaped path;

a stationary electronic X-ray detector positioned opposite to the X-ray source; and

a mechanical driving mechanism which is adapted to move the X-ray source in the arc shaped path.

[c13] 13.The system of claim 12, further comprising a processor electrically connected to the electronic X-ray detector, wherein the processor forms a three dimensional image of an imaged object from a signal output by the electronic X-ray detector.

[c14] 14.The system of claim 13, wherein:

the electronic detector is mounted to a detector support, such that an imaging volume is formed above the detector where a patient's breast is adapted to be placed to be imaged;

the electronic X-ray detector comprises an X-ray sensitive scintillator and a solid state radiation detector; and

the system is positioned substantially vertical relative to ground.

[c15] 15.The system of claim 12, wherein:

the X-ray source is mounted to the arc shaped track;

the mechanical driving mechanism comprises a motor which is attached to the X-ray source and is adapted to move the X-ray source along the arc shaped track; and

the electronic X-ray detector is located facing the X-ray source such that an imaging volume is formed above the electronic X-ray detector.

[c16] 16.The system of claim 12, wherein:
the X-ray source is mounted to the arc shaped track and connected to a first portion of a first arm;
the second portion of the first arm distal from the first portion is connected to the mechanical driving mechanism; and
the mechanical driving mechanism comprises a motor which is adapted to rotate the second portion of the first arm to move the X-ray source along the arc shaped track.

[c17] 17.The system of claim 12, wherein:
the X-ray source is mounted to a first portion of a first arm;
a second portion of the first arm distal from the first portion is mounted to the arc shaped track; and
the mechanical driving mechanism comprises a motor which is adapted to move the second portion of the first arm along the arc shaped track to move the X-ray source in the arc shaped path.

[c18] 18.A tomosynthesis X-ray mammography imaging system, comprising:
an X-ray source mounted onto an upper portion of a first arm;
a second arm having a first side and a second side,
a stationary electronic X-ray detector mounted facing the X-ray source to a first side of the second arm such that an imaging volume is formed above the electronic X-ray detector;
a shaft rotatably connecting a middle portion of the first arm to a middle portion of a second side of the second arm;
a linear motion track adapted to move relative to the second arm; and
a mechanical driving mechanism which is adapted to move a lower portion of the first arm along the linear motion track such that the X-ray source moves in an arc shaped path.

[c19] 19.The system of claim 18, further comprising:
a processor electrically connected to the electronic X-ray detector, wherein the processor forms a three dimensional image of an imaged object from a signal output by the electronic X-ray detector;

a pivot plate connected to a lower portion of the second arm; and

a pivot pin rotatably connecting the pivot plate to the linear motion track, such that the linear motion track moves relative to the second arm while the X-ray source moves in the arc shaped path.

[c20] 20.The system of claim 19, wherein:

the X-ray source is mounted to the first arm such that it is positioned adjacent to the first side of the second arm and moves in the arc shaped path in a plane parallel to the first side of the second arm;

the electronic detector comprises an X-ray sensitive scintillator and a solid state X-ray radiation detector;

the mechanical driving mechanism comprises a ball screw; and

the system is positioned substantially vertical relative to ground.

[c21] 21.The system of claim 18, further comprising:

a processor electrically connected to the electronic X-ray detector, wherein the processor forms a three dimensional image of an imaged object from a signal output by the electronic X-ray detector;

a movable member connected to a lower portion of the second arm; and

a pivot pin rotatably connecting the movable member to the linear motion track, such that the length of the movable member varies as the linear motion track moves relative to the second arm while the X-ray source moves in the arc shaped path.

[c22] 22.A tomosynthesis X-ray mammography imaging system, comprising:

a first means for irradiating a patient's breast with an X-ray dose at a plurality of steps along an arc shaped path;

a second means for mechanically moving the first means in a stepped motion on the arc shaped path around the patient's breast;

a third means for detecting the X-rays transmitted through the patient's breast; and

a fourth means for constructing a three dimensional image of the patient's breast from a signal output by the third means.

[c23] 23.The system of claim 22, wherein the system is positioned substantially

vertical relative to ground.

[c24] 24.The system of claim 22, further comprising a fifth means for providing the arc shaped path for the first means.

[c25] 25.The system of claim 23, further comprising a sixth means for connecting the first means to the second means, and for moving the first means along the fifth means.

[c26] 26.The system of claim 22, further comprising:
a seventh means for connecting the first means to the second means; and
an eighth means for providing an arc shaped path for movement of the seventh means.

[c27] 27.The system of claim 22, further comprising:
a seventh means for connecting the first means to the second means;
an eighth means for providing a linear motion path for the seventh means;
a ninth means for supporting the third means such that an imaging volume is formed;
a tenth means for allowing relative motion between the eighth means and the ninth means to allow the first means to move in the arc shaped path while the seventh means moves along the linear motion path.

[c28] 28.The system of claim 22, further comprising a ninth means for supporting the third means such that an imaging volume is formed.

[c29] 29.A tomosynthesis X-ray imaging method, comprising:
mechanically moving an X-ray source in a stepped motion on an arc shaped path around an object using a track;
irradiating the object with an X-ray dose from the X-ray source located at a plurality of steps along the arc shaped path;
detecting the X-rays transmitted through the object with a stationary electronic X-ray detector; and
constructing a three dimensional image of the object from a signal output by the electronic X-ray detector.

[c30] 30.The method of claim 29, wherein the step of mechanically moving an X-ray source comprising moving the X-ray source on an arc shaped track.

[c31] 31.The method of claim 30, wherein the X-ray source is moved on the arc shaped track by a first arm being rotated by a motor.

[c32] 32.The method of claim 29, wherein the step of mechanically moving an X-ray source comprises moving a first portion of a first arm on an arc shaped track while a second portion of the first arm supports the X-ray source.

[c33] 33.The method of claim 29, wherein the step of mechanically moving an X-ray source comprises moving a first arm supporting the X-ray source on a linear motion track while allowing relative motion between the track and a second arm supporting electronic X-ray detector.

[c34] 34.The method of claim 29, wherein:
the object comprises a patient's breast;
the patient is standing adjacent to the machine;
the patient's breast is located on the electronic X-ray detector; and
the X-ray source moves above the patient's breast in the arc shaped path.

[c35] 35.The method of claim 34, wherein the X-ray source moves in the stepped motion at a speed of about 0.1 to about 1.5 seconds per step along the arc shaped path of about 20 to about 60 degrees.

[c36] 36.The method of claim 35, wherein:
the arc shaped path contains 5 to 15 steps separated by about 2 to about 10 degrees; and
the X-ray source emits a dose of X-rays at each step.